

Application No. 10/709,288
Technology Center 1775
Amendment dated February 7, 2007
Reply to Office Action dated September 7, 2006

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (Currently amended): A protective coating on a silicon-containing surface, the protective coating consisting essentially of barium oxide, strontia, alumina, and silica, and incidental impurities so as to have a barium-strontium aluminosilicate composition, the protective coating having an outer surface region consisting essentially of one or more stoichiometric crystalline phases of barium-strontium aluminosilicate and being substantially free of a nonstoichiometric second crystalline phase of barium-strontium aluminosilicate that contains a substoichiometric amount of silica;

wherein at least the outer surface region of the protective coating is in a thermal treated state and contains sealed porosity formed by volatilization of the nonstoichiometric second crystalline phase in the outer surface region.
silica.

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Claim 2 (Currently amended): A protective coating according to claim 1, wherein substantially all of the protective coating consists essentially of the one or more stoichiometric crystalline phases of barium-strontium aluminosilicate, contains sealed porosity, and is substantially free of the nonstoichiometric second crystalline phase of barium-strontium aluminosilicate.

Claim 3 (Original): A protective coating according to claim 2, wherein the protective coating contains at least 47 molar percent silica.

Claim 4 (Original): A protective coating according to claim 2, wherein the protective coating consists of, by molar percent, about 25% barium oxide + strontia, about 25% alumina, about 50% silica, and incidental impurities, and strontia constitutes less than 25 molar percent of the barium oxide + strontia content of the protective coating.

Claim 5 (Original): A protective coating according to claim 1, wherein the protective coating has a silica to BaO+SrO molar ratio at or above 2:1, has an alumina content of greater than 25 molar percent, and contains up to about 2 atomic percent of an alumina phase.

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Claim 6 (Original): A protective coating according to claim 1, wherein the protective coating has a second region beneath the outer surface region, the second region containing the nonstoichiometric second crystalline phase.

Claim 7 (Original): A protective coating according to claim 6, wherein the outer surface region of the protective coating contains at least 47 molar percent silica and the second region of the protective coating contains less than 47 molar percent silica.

Claim 8 (Original): A protective coating according to claim 6, wherein the outer surface region of the protective coating consists of, by molar percent, about 25% barium oxide + strontia, about 25% alumina, about 50% silica, and incidental impurities, and strontia constitutes less than 25 molar percent of the barium oxide + strontia content of the protective coating.

Claim 9 (Original): A protective coating according to claim 6, wherein the outer surface region of the protective coating has a thickness of about 10 to about 25 micrometers.

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Claim 10 (Original): A protective coating according to claim 1, wherein the protective coating is part of a barrier coating system on the silicon-containing surface, the barrier coating system further comprising at least one intermediate layer between the protective coating and the silicon-containing surface, the at least one intermediate layer containing a material chosen from the group consisting of silicon and mullite.

Claim 11 (Currently amended): A protective coating for a silicon-containing surface of a gas turbine engine component, the protective coating being a part of a barrier coating system comprising at least one intermediate layer on which the protective coating is deposited, the at least one intermediate layer containing a material chosen from the group consisting of silicon and mullite, the protective coating consisting of barium oxide, strontia, alumina, and silica, and incidental impurities so as to have a barium-strontium aluminosilicate composition, the protective coating having an outer surface region consisting essentially of the stoichiometric crystalline celsian phase of barium-strontium aluminosilicate and a second region beneath the outer surface region consisting essentially of the stoichiometric crystalline celsian phase of barium-strontium aluminosilicate and optionally ~~and not more than five volume percent of~~ a nonstoichiometric crystalline lamella phase of barium-strontium

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aluminosilicate that contains a substoichiometric amount of silica:

wherein at least the outer surface region of the protective coating is in a thermal treated state and contains sealed porosity formed by volatilization of the nonstoichiometric crystalline lamella phase in the outer surface region.

silica.

Claim 12 (Original): A protective coating according to claim 11, wherein the protective coating contains at least 50 molar percent silica.

Claim 13 (Original): A protective coating according to claim 11, wherein the protective coating consists of, by molar percent, about 25% barium oxide + strontia, about 25% alumina, about 50% silica, and incidental impurities.

Claim 14 (Original): A protective coating according to claim 13, wherein strontia constitutes less than 25 molar percent of the barium oxide + strontia content of the protective coating.

Claim 15 (Original): A protective coating according to claim 11, wherein the protective coating has a silica to BaO+SrO molar ratio at or above 2:1, has an alumina content of greater than 25 molar percent, and contains up

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to about 2 atomic percent of an alumina phase.

Claim 16 (Currently amended): A protective coating according to claim 11, wherein the protective coating has a second region beneath the outer surface region, the second region containing the nonstoichiometric crystalline lamella phase. ~~is in an as-deposited condition.~~

Claims 17-40 (Canceled)

Claim 41 (Previously presented): A protective coating according to claim 1, wherein the protective coating consists of barium oxide, strontia, alumina, silica, and incidental impurities.

Claim 42 (Canceled)

Claim 43 (Previously presented): A protective coating according to claim 1, wherein the outer surface region of the protective coating contains not more than ten volume percent of the nonstoichiometric second crystalline phase.

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Claim 44 (Previously presented): A protective coating according to claim 1, wherein the outer surface region of the protective coating contains not more than five volume percent of the nonstoichiometric second crystalline phase.

Claim 45 (Previously presented): A protective coating according to claim 1, further comprising a top coat of insulating material on the protective coating.

Claim 46 (Previously presented): A protective coating according to claim 45, wherein the insulating material is stabilized zirconia.

Claim 47 (Previously presented): A protective coating according to claim 11, further comprising a top coat of insulating material on the protective coating.

Claim 48 (Previously presented): A protective coating according to claim 47, wherein the insulating material is stabilized zirconia.